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How fieldwork-oriented biology teachers establish formal outdoor education practices

Anttoni Kervinen, Anna Uitto and Kalle Juuti

Department of Educational Sciences, University of Helsinki, Helsinki, Finland

ABSTRACT

Fieldwork is an important part of biology as well as science and biology education. However, teachers perceive several reasons for the limited use of fieldwork in schools. Further, outdoor education is often organised as a single fieldtrip guided by outdoor educators, and little research has been done on fieldwork as a regular part of formal biology education. This case study explores three secondary-school biology teachers who untypically use outdoor education as a major part of their ecology courses for 8th grade students (median age 14). Berger and Luckmann's theory of the process of institutionalization as a theoretical background is used to interpret the pedagogical and organizational choices of the case study teachers. Analysis of the interviews of the selected three teachers revealed pedagogical and organizational means through which outdoor teaching is institutionalized into a regular activity in biology lessons. The teachers considered regularity, assessment practices and the school curriculum as major tools to legitimate outdoor learning as a formal schoolwork and foster successful learning. However, they also emphasised students' freedom during outdoor activities. The findings are discussed in terms of how the teachers succeeded in combining the institutional order of formal schooling with students' freedom in nature.

KEYWORDS

Outdoor education; fieldwork; biology education; ecology; formal outdoor education

Introduction

Outdoor environments are considered important and authentic learning environments in biology education with several cognitive and affective benefits for students (e.g. Rickinson et al., 2004; Randler, Ilg, and Kern, 2005; Drissner, Haase, and Hille, 2010). Activities outside the classroom are believed to be helpful in connecting schoolwork with a changing society as well as in enhancing students' performance and attitudes towards school learning (Rennie, 2014; Resnick, 1987). In particular, the use of outdoor environments and fieldtrips allows students to engage in authentic science learning of different topics in biology, especially the structure and function of ecosystems (Braund and Reiss, 2006). In several countries, including Finland, there have been initiatives to increase the use of diverse learning environments, including the outdoors (FNBE, 2014; Department for Education and Skills, 2006).

Despite its educational potential and curricular incentives, there is concern about the relatively little use of fieldwork and fieldtrips in schools (Lock, 2010; Lloyd et al., 2012; Kärnä, Hakonen, and Kuusela, 2012; Uitto and Kärnä, 2014). Lloyd et al. (2012) reported that nature outings are scarce and remain primarily 'add-ons' to the formal teaching. Findings from previous studies suggest that important factors in outdoor teaching relate both to teachers' pedagogical choices (Glackin, 2016; Lavie Alon and Tal, 2017) as well as to school culture and community (Hovardas, 2016; Scott et al.,

CONTACT Anttoni Kervinen anttoni.kervinen@helsinki.fi

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2015). However, most studies are focused on describing and discussing the obstacles that prevent teachers from using outdoor teaching (e.g. Scott et al., 2015; Lock, 2010; Glackin, 2018; Bentsen et al., 2010), whereas studies that analyse the practices in successful formal outdoor teaching are few.

In this article, we investigate the implementation of outdoor teaching as part of formal schoolwork. We concentrate on the ways that have been used to include outdoor teaching as part of formal schoolwork by studying the views of biology teachers who use fieldwork as an established practice. While teachers' views seem to be central to successful outdoor practices (Glackin, 2016; Rickinson et al., 2004), we argue that in order to understand the prerequisites of formalized outdoor education, it is valuable to consider the instruction in terms of institutionalized school practices (c.f. Davies and Guppy, 2010, 47–49).

Formal outdoor teaching

Most studies focus on single fieldtrips guided by teachers or outdoor educators (e.g. Drissner, Haase, and Hille, 2010; Randler, Ilg, and Kern, 2005) or longer-lasting outdoor teaching projects (e.g. Glackin, 2016; Fägerstam and Blom, 2013). Fägerstam and Blom (2013) concluded that only a few studies focus on outdoor learning as part of ordinary school work. On the other hand, how the outdoor practices are to be implemented and to what extent they should resemble ordinary schoolwork and typical formal teaching practices are debated. Rea (2008) argued that 'the power of outdoor learning may also lie in the informality and deeply contextual learning activities engaged in, approaches to learning that traditional schooling struggles to do well'. Lavie Alon and Tal (2017) found that outdoor educators' use of the natural environment was primarily structured and teacher-led, and they also suggest that less structured activities and more free choice time could promote learning as well as positive attitudes.

Studies on teachers' perceptions have shown that obstacles to outdoor teaching relate to teachers' skills, confidence and fear of losing control (Glackin, 2018; Bentsen et al., 2010) and avoiding student risk (Connolly and Haughton, 2015) as well as to an overcrowded curriculum and school practices that are constraining (Scott et al., 2015). The questions of how to overcome these obstacles in a continuous outdoor teaching environment and successfully include it in the curriculum and in formal biology education remains unanswered. Modern formal school systems around the world share common characteristics of institutionalized education practices (Davies and Guppy, 2010, 48–49). In order to understand better the use of outdoor education in practice and in the curriculum, it is therefore relevant to explore how formal outdoor teaching appears in terms of institutionalized schooling with its typical, specific characteristics. For our analytical approach, we borrow from Berger and Luckmann's (1966) theoretical insights of institutionalization as a social and interactive process.

Theoretical background

Modern school systems around the world share many similarities in their education curricula, age-graded classes, systematic testing and professional training of teachers (Davies and Guppy, 2010, 132–133). These and many other characteristics comprise the formal structure of schools, which has been institutionalized over the past century around the world (Meyer and Ramirez, 2000). Despite the fact that some aspects of schools are controlled and standardized with formal structures, the actual practices and activities in classrooms often diverge from these formalities. According to institutional theorists, the formal structures and actual activities in schools are *'decoupled'* in such a way that school activities are considered to fulfil the formal boundaries while the actual instruction is not closely monitored (Meyer and Ramirez, 2000; Meyer et al., 1997). Through this 'decoupling', schools maintain a face of legitimacy while at the same time the teachers have a relatively large amount of autonomy in their classroom activities (Davies and Guppy, 2010, 133).

Outdoor learning is hardly the core of school institutions' formalities. Although concerns about the limited use of outdoor education are typical (Lock, 2010; Lloyd et al., 2012; Kärnä, Hakonen, and Kuusela, 2012), there is no consensus on how much fieldtrips should even follow the institutions' formal structures and classroom-like teaching practices (e.g. Rea, 2008; Rickinson et al., 2004; Lavie Alon and Tal, 2017). Berger and Luckmann (1966) analysis of the process and mechanisms of institutionalization provides a valuable tool for understanding the potential of outdoor teaching in institutionalized school practices.

Berger and Luckmann (1966) describe the formations of institutional structures as a cognitive and interactional process that takes place between individuals. The process of institutionalization of any activity begins with habitualizing, whereby the activity can be performed repeatedly with the same effort and starts to appear as a predictable pattern for the performer. *Habitualization* reduces the psychological gain needed for the activity and makes room for deliberate decisions and innovations. According to Berger and Luckmann, any such habitualization turns into an institutionalized practice whenever there is *reciprocal typification* of the actions and the actors. Through the typification, the habitualized actions become institutions available to all members of the social group in question.

An important phase in the process of institutionalization is the one in which the institutionalized activities are passed on to others who were not originally involved in the institution. Only at this point, state Berger and Luckmann, is an institution perceived and become an objective reality for the actors. Analogous to the reality of the natural world, the social formations of the institution then confront the individuals as external and coercive facts. In order for the established institutional order to be transmitted to the new generation, a process of *legitimation* needs to take place. Because the original institutional order has no subjective relevance for the new generation, there must be 'explanations and justifications of the salient elements of the institutional tradition' (111). According to Berger and Luckmann, legitimation includes both cognitive and normative aspects: a justification of the values of an institutional tradition must be preceded by an explanation for the reasons why an individual performs or does not perform a certain action. Through legitimation, the institutional reality is made objectively available and subjectively plausible for new individuals.

Another aspect of Berger and Luckmann's analysis is important for our exploration of outdoor education in terms of institutionalization. According to them, a controlling character is inherent in the very nature and objectivity of the institutions. The *objectified* institutions appear as undeniable and persistent external structures, which have power over the individual by the sheer force of their existence. Despite the objective validity of the institutions, it is more likely that the individual will deviate from the institutional programmes originally set by others than from programmes established by the individual. Thus, specific control mechanisms are usually attached to the most important institutions in the form of various sanctions. The established sanctions enable institutions to claim authority over the next generation of individuals, as they are socialized into the institutional order independent of the subjective meaning they may give to any particular situation.

Berger and Luckmann's analysis of institutionalization offers insight into how a social process that is not institutionalized can develop into an institutionalized structure. Formal outdoor teaching is both a desirable and a contested goal (e.g. FNBE, 2014; Rea, 2008). Acknowledging formal outdoor teaching as a process of institutionalization provides valuable perspective on outdoor teaching practices. Keeping in mind the notion of school as a 'decoupled' institution (Meyer and Ramirez, 2000), we suggest that the institutional characteristics of school practices affect the way that formal outdoor teaching can be implemented.

The study

The purpose of this study was to explore how the case study teachers manage to include extensive outdoor teaching in their formal biology lessons. As the teachers' views and practical knowledge are pivotal in reforming science education (Van Driel, Beijaard, and Verloop, 2001), focusing on

their pedagogical thinking and teaching practices provides important understanding in terms of formalizing outdoor teaching and overcoming potential obstacles. The findings are discussed from the perspective of institutionalization of formal teaching. The study was guided by the following research question:

> *What pedagogical and organizational means do fieldwork-oriented biology teachers use to integrate outdoor teaching into the formal teaching of biology?*

Description of the cases

The multi-case study (Bogdan and Biklen, 2006) focused on three secondary-school biology teachers, Krista, Joel and Laura (teacher and school names are all pseudonyms). They were working in two secondary schools (for students ages 13 to 15), Kuusela and Koivula, in an urban area of southern Finland. Both schools were generally known to have a tradition in organizing outdoor science education and thus selected for a larger research project on outdoor education. Accordingly, the teachers were selected for their experience in using fieldwork unusually extensively in secondary-school biology teaching. All three were subject teachers in biology education and qualified to teach in Finnish secondary and upper secondary schools. At the time of the interview, Krista had been teaching biology for 30 years, Joel for 6 years and Laura for 8 years. For decades, Krista had been developing a biology curriculum that emphasises outdoor learning at the Kuusela school, but at the time of the interview she had been working in a school in Koivula for three years, using the same outdoor-intensive model. Joel and Laura were working in Kuusela and had adopted an outdoor emphasis in their teaching. In both schools, the biology course on the forest ecosystem included fieldwork in a majority of the lessons. The educational goals of the teaching were consistent with the Finnish national core curriculum (FNBE, 2014). However, as fieldwork and other out-of-school activities are not that common in Finnish secondary schools (Uitto and Kärnä, 2014), the implementation of the course was quite different to the average pedagogical arrangements in biology courses in Finland. The participation was voluntary for the teachers and it based on informed consent. The research complied with the guidelines of The National Advisory Board on Research Ethics (2012) in terms of respecting the autonomy and anonymity of research subjects, avoiding harm and ensuring the privacy of data collection and safe storing of the data.

All three teachers used outdoor teaching as a major part of their biology teaching in two courses, one focussing on water ecosystems and another focussing on forest ecosystems. In the forest ecosystem course, outdoor teaching accounted for 60 to 80 per cent of the lessons; in the water ecosystem course it made up about 30 per cent of the lessons. The teachers had many similar practices in organizing their teaching. This was partly because of their common history in the Kuusela school, which has a long tradition of outdoor teaching.

The learning activities in the forest were diversified and included short-term activities as well as longer-lasting inquiries. The short-time activities were, for example, observing and discussing different types of forests, identifying abiotic and biotic factors, observing different biotopes and layers of vegetation, and collecting and identifying invertebrates, mushrooms, tree leaves and plants.

Data collection and analysis

The first author interviewed the teachers. The interviews were semi-structured in a way that predesigned questions were used to cover all the areas of interest. However, the questions were open-ended, and the interviews were directed by the teachers' responses in an informal manner. Teachers were asked about 1) their experiences and how they used fieldwork in their teaching, 2) their views on and justification for fieldwork as part of biology education, and 3) the challenges related to fieldwork. It was emphasized that the teachers' practices are not being evaluated and

they were asked for the interviews because they were known to use outdoor teaching. The interviews took about an hour each.

The interviews were audio recorded and transcribed. We analysed the data through thematic analysis by identifying, analysing and reporting patterns within the material (Boyatzis, 1998; Braun and Clarke, 2006). The unit of analysis was a sequence of talk consisting of one or several sentences that formed a coherent expression or idea. The analysis focused on the semantic content of the data, that is, the experiences of and meanings given to outdoor learning by the teachers, regarded as the reality for the participants. However, in addition to the explicit meanings, we also sought to identify and interpret underlying ideas, assumptions and conceptualizations in the participants' speech, which Boyatzis (1998) refers to as analysing themes at a latent level. The analysis followed the six phases as suggested by Braun and Clarke (2006), presented in Table 1.

Findings

Applying thematic analysis, we identified two main themes and three subthemes from teachers' interviews on organizing their teaching of the forest ecosystem (Table 2). In the following, we present and discuss how teachers described their teaching on the forest through these two themes and subthemes. We support our findings with representative samples of the teachers' answers.

Representing outdoor teaching as ordinary learning

Krista, Joel and Laura all talked about several practices and approaches for representing outdoor teaching as ordinary learning for the students and other actors in the educational community. The goal was to justify the outdoor teaching for the students as a proper and normal way of learning biology instead of a fun add-on to the classroom-centred lessons; as Krista expressed it:

> *Because it's still difficult for them to understand that this is real schoolwork. They like to think that when they get out of the classroom, it means that it's just fun. (Krista)*

The practices that teachers use for making outdoor learning 'real schoolwork' can be interpreted as ways to institutionalize outdoor teaching and learning which otherwise are not represented as a typical school classroom with its institutional order. We will use Berger and Luckmann (1966)

Table 1. The thematic analysis of the interviews.

Phase	Analytic process
1. Becoming familiar with the data	The interviews were transcribed and then read several times.
2. Generating initial codes	Initial codes were produced by one researcher.
3. Searching for themes	Themes were searched from the coded data and the coded data extracts were sorted into relevant themes and subthemes.
4. Reviewing themes	The themes were reviewed and revised by three researchers to assure their internal and external homogeneity by comparing them in relation to the data segments included as well as to the entire data set.
5. Defining and naming themes	The themes were refined, named and interpreted in relation to the research questions.
6. Producing the report	The final report was produced, and the data extracts were included in it in order to enhance the transparency of the results.

Table 2. The themes and subthemes identified from the interviews on teachers' outdoor education practices and arguments.

Theme	Subthemes
Representing outdoor teaching as ordinary learning	Regularity Assessment School curriculum
Balancing control and students' freedom	

concepts of *habitualization, objectification* and *legitimation* to analyse the teachers' practices used for this purpose.

Regularity

All teachers emphasised that students need practice in studying outdoors and in learning biology through fieldwork.

> *If you go to the forest for the first time, it's very likely that the students may behave kind of like animals. [. . .] But if you repeat it enough times, then at some point, like other any other activity, it gets more familiar. (Joel)*

The teachers expressed a strong need for the students to *habitualize* themselves in performing learning tasks in the outdoor environment. Following the argumentation of Berger and Luckmann (1966), the teachers perceived the regularity of the fieldwork as reducing the psychological gain needed for the unfamiliar activity. Habitualizing themselves to outdoor activities, it was noted, takes time. In addition, following Berger and Luckmann's analytical framework, the *legitimation* of outdoor teaching as a conventional lesson by explaining and justifying it for the students was a necessary step in moving from a habitualized activity towards an institutionalized one:

> *The students get a feeling that it's not just an add-on, that now we're just going to have some fun outdoors. But instead it's real studying. And it also takes a lot of time and kind of repetition as well as justification by the teacher. (Joel)*

The importance of regularity is consistent with the arguments by Randler, Ilg, and Kern (2005), namely that regular excursions reduce the novelty of outdoor environments and will benefit learning. In contrast to what was proposed by them as well as by Rickinson et al. (2004), however, the teachers in this study emphasised regular tasks outdoors rather than separate pre- and post-task activities in the classroom. This further emphasises that the teachers in this study endeavoured to integrate the outdoor activities into their teaching not merely visits to the forest, but as actual regular learning situations. To achieve this, classroom tasks did not seem to be necessary.

Assessment

All three teachers had similar practices when they assessed the students' learning. The teachers used ongoing learning assessments throughout the courses by giving several small tasks that were evaluated. The tasks also contributed to the course grade. For example, when collecting invertebrates in the forest, the student groups would get points for different species and more points for identifying the invertebrates. The forest ecosystem course included six to ten evaluated activities, mostly carried out in groups, but some individually, each having an effect of contributing 10 to 30 per cent on the final grade.

The teachers did not see the quantitative assessment as an ideal motivational factor for learning. However, they did consider it a key factor for successful outdoor teaching. Ongoing assessment gave students the motivation to put effort into outdoor activities. It was used to show students that outdoor activities contribute to ordinary learning just like the classroom teaching to which they are accustomed.

> *Because otherwise they don't appreciate what they're doing themselves. It really is quite sad. You see, they only appreciate memorising textbooks. [. . .] Because they always think a bit like, what they think with their own brain is somehow less than the nice sentences in the textbook. [. . .]Because it's still difficult for them to understand that this is real schoolwork. They like to think that when they get out of the classroom, it means that it's just fun. (Krista)*

Assessment practices are characteristic of the institutional order of the formal school (Davies and Guppy, 2010, 49). The addition of continuous assessment to outdoor teaching can be interpreted as serving two purposes in the process of institutionalization. Following Berger and Luckmann (1966) analysis, an assessment can be interpreted as a specific control mechanism and a form of *sanction* used to socialise students into outdoor learning despite their initial subjective perception

that outdoor learning is not an important means of learning. On the other hand, the teachers used assessment practices to *legitimate* outdoor teaching by using it to explain that the students' tasks contribute to their learning of biology. The latter purpose of the assessment was considered to promote students' responsibility for their own learning, emphasising that the assessment had not only a controlling objective:

> *It motivates really much that they know where their grade comes from and how it all the time accumulates. […] You can kind of totally fail in something but improve in another. […] And it is easier to justify to the parents where the grade comes from and what we have done. (Laura)*

School curriculum

The outdoor-intensive curricula in the two schools were based on the Finnish national curriculum of basic education (FNBE, 2014). With the school curriculum, it was possible for the teachers to justify many outdoor activities to students, parents and school management and have these activities regarded as ordinary schooling. Teachers' references to the curriculum relate directly to the institutional structure of the school. However, the curriculum was not only a justification for the pedagogical choices, but also was used explicitly to *legitimate* outdoor education to students (c.f. Berger and Luckmann, 1966). In the following quotation, Laura refers to the textbook as a curriculum-based construct and once again describes the importance of explicitly justifying outdoor teaching to students:

> *Well, I think the goals are the same as in the classroom. […] We do have textbooks too. But often when students say that, hey, we haven't done anything from the textbook, when we start to look together at those chapters in the book… we actually have done, like, everything. […] (Laura)*

When implementing the curriculum, the teachers emphasised the importance of school culture and school practices in managing course schedules and timing. The *legitimation* of outdoor teaching concerned not only the students, but also other actors:

> *The school community, the parents and everyone should have accepted that it is normal and so is supported. (Joel)*

The emphasis on support from the school community for outdoor teaching highlights the desire to represent outdoor teaching as part of the school institution. One of the constitutive aspects of the institution is its *reciprocal* typification by all the actors involved (Berger and Luckmann, 1966). As the tradition of outdoor teaching within the school community is established, actors perceive institutionalized activity as an *objectified*, persistent external structure by the actors

A quotation from Krista illustrates how outdoor education practices appear to her students to differ from typical textbook-based learning. However, it also illustrates that the students perceive the activity as a plausible and meaningful way of learning biology.

> *And the ninth graders [secondary school] asked the sixth graders [primary school] what kind of biology [teaching] they have. And I heard that the sixth graders said that we usually use our textbook. And they said vigorously that we really don't, that we actually do like [having outdoor activities]. (Krista)*

With Berger and Luckmann's analysis in mind, we understand the outdoor activities as appearing to the students as *objectified reality*, something that is needed for an institution to be legitimized for the *new generation* of individuals. The quotation highlights the idea that the institutionalization of outdoor activities may happen only when the activities appear to be legitimate and justified means of learning for the students.

The teachers mentioned only a few obstacles to outdoor teaching. They were related to the proximity of a suitable natural environment and on the other hand organizing longer classes than just a single 45 minutes lesson at a time. Also, weather and student's inadequate clothing prevented teachers from going outdoors as much as they would have liked. The obstacles mentioned to outdoor teaching can be understood in terms of lack of institutionalization and

established practices. The teachers perceived these barriers primarily as a matter of organizational effort, which could be overcome by establishing a supportive institutional structure in the school.

Balancing control and students' freedom

While many of the teachers pedagogical and organizatorial choises were realted or aimed to strengthen the institutional structures during outdoor teaching, some of the pedagogical approaches actually diverged from the typical institutional practices. The teachers placed a great deal of emphasis on fostering students' spontaneous experiences and took a less authoritative approach to teaching, similar to what has been suggested in some of the previous research (c.f. Rea, 2008; Lavie Alon and Tal, 2017; Glackin, 2016).

The teachers Krista, Laura and Joel discussed how to structure the outdoor lessons in a way that would provide a sense of freedom for the students. All three used a number of group work activities, during which student groups would stay in one place or move in the forest rather freely. Typically, in the beginning of the lesson, the teacher gave the instructions – either in the classroom or in the forest – and allowed the students to work independently while the teacher moved between the groups and at the end of the lesson collecting the tasks or else summarizing the lesson. The level of student freedom in moving in the forest as well as the level of the teacher's guidance depended on the behaviour and skills of the student group in question.

> *If they are a sensible group, I let them go on their own, too. Or if the class is a kind of messier one, we go there together and come back together. […] I always move around between the groups and see where they are going and encourage them. […] Some groups are such that they do everything independently, but others can be kind of weaker. (Laura)*

The freedom of the students was perceived as serving several purposes. All the teachers considered it important for students to interact freely with each other and also to talk about things other than those specifically related to the topic, especially during the transitions and after completing the tasks. Joel and Krista believed that overstructuring outdoor learning and demanding full-time focus on the task might hamper the authentic experience of being in nature and even limit the students' possibilities to observe and think.

> *Then it really easily happens that they go there [to the forest], and they quickly take a few pictures. […] But when they have the instruction, then they don't that easily kind of calm down a bit and look around. Because the task is done. So, in my opinion, you should be quite careful not to kind of make the outdoor excursions too efficient – like click click and that's it. (Joel)*

> *Well, let's say that the more discipline you have with them, the less they can think. Because they will just concentrate on staying in control. (Krista)*

The notions that excessive structure and control will hamper thinking and authentic experience are in line with Rea's findings (2006), namely that students participate in reflective activities during outdoor trips spontaneously when not encouraged by the educators. In addition, the freedom in outdoor learning was seen to have a positive impact on the teacher-student relationship. This, in turn, was considered to benefit both dealing with behavioural challenges and learning.

> *And those who are terribly restless, they keep running around. But they always come across me from time to time. And they always have something like, 'look what I found'. And you can have a kind of small positive moment, something which is difficult to have in the classroom with such a lively student. (Krista)*

> *The student-teacher relationship really is many-sided and different there. And after that [the development of the relationship] you can start to talk about the value of having the beetle in your hand compared to having it in the textbook. (Joel)*

When it comes to controlling students and classroom management, all three teachers perceived that behavioural issues could be more easily dealt with in outdoor settings than in the classroom.

And usually also those wild pupils will calm down there. Of course, they can get in a little bit of running there and consume their energy, but they will then calm down and get excited about the activity. Whereas if we were in the classroom, then they would just, like, spin in their chairs, and they couldn't manage it. (Laura)

The practical solutions to class management included, for instance, the use of well-defined tasks and instructions, mobile phones and WhatsApp groups for communication. Laura reported that only in rare cases had she left a challenging student with another class for a lesson or two, after which the behaviour outdoors quickly improved. This implies that the use of various *sanctions* as specific control mechanisms (Berger and Luckmann, 1966) were not used very much to control the students. Indeed, when the trust with the students was gained, the freedom itself was perceived as a sufficient way to support the control. Laura and Krista imply that the freedom is accompanied with a certain level of uncertainty for the students, which produces control.

But I have experienced that the best way is that I go in front and not look behind that much. [laughs] Then they don't kind of know where we are going and what the teacher is going to do next, so they will follow. Funnily enough, they lumber behind. (Laura)

For example, if you have really difficult students, don't give them a map. Take them somewhere where they kind of don't know for sure where they are. […] Or if you have kind of nice students, you can give them a map and say that you are allowed to move in this area. Then they'll have kind of an illusion of freedom. (Krista)

The seemingly unintuitive approach to managing the classroom by increasing students' freedom in the outdoor environment is in line with Glackin's (2018) findings. She showed that during a two-year professional development project, some teachers successfully started to implement less authoritative strategies, even though to some extent they still showed fear of losing control.

Whereas increasing control through institutional structures, as discussed earlier, could help present outdoor learning as justified schoolwork, promoting students' freedom in the forest was related to the goals of supporting students' general well-being and also encouraged them to take responsibility for the environment. Laura, for example, considered outdoor lessons as a means to counterbalance students' everyday lives with the potential health benefits of being outdoors:

But there has also been research evidence that being in the forest lowers blood pressure and so on. So you can tell it from the students. They lead such busy lives and now when they… like the hurry ends when you get there, even if you had only an hour of time. And somehow they calm down in there. (Laura)

Similar goals have been connected with outdoor teaching settings in other research as well (Drissner, Haase, and Hille, 2010; Ballantyne and Packer 2002). In this respect, the teachers regarded the authentic experience as having broader goals than just fulfilling the curricular learning outcome expectations. However, student freedom was considered somewhat contrary to the institutional structures and curricular learning outcome expectations that were used to increase control, as discussed earlier. For example, Krista emphasised giving students 'an illusion of freedom'. She did not even aim to control the students to the extent that they would concentrate only on the task, but gave value even to off-topic spontaneous activities:

And then they have kind of a little fun when they don't have to be under my watch all the time. That you can have a nice time in nature with your friends, I think that it kind of carries them. […] (Krista)

This tension also appeared in the teachers' reflections on the goals of outdoor learning. Joel, especially, pointed out a potential contradiction between the curricular goals of conceptual learning and other goals that he connected with authentic experiences in nature, when he reflected on how outdoor learning can lead to less detailed learning compared to textbook-based learning:

In a way, I understand the teachers who think that you cannot do things outdoors because they won't learn, like, the real things. […] Even though I really like outdoor teaching, there is sometimes that kind of risk for fiddling around or it remains a little cursory. (Joel)

He went on to conclude that learning in the forest has other goals that may be more important, saying that the authenticity of the learning surpasses the risk of less detailed knowledge:

> *But then I always come back to the idea that it would remain cursory in the classroom as well. [. . .] So it's really hard to value if it's actually more important that they are there on the cliff and kind of experience it than if they possibly learn to identify that kelp or not. [. . .] Sure, probably one of the most essential missions in middle school is to get students inspired by things rather than aiming to learning everything by heart. . . (Joel)*

Conclusions and implications

In this article, we have sought to contribute to the research on outdoor education practices and teachers' perceived obstacles to using outdoor education. Combining outdoor teaching in the nature in the vicinity of the school with formal school work has been considered both desirable and challenging (Glackin, 2016; Lavie Alon and Tal, 2017; Ayotte-Beaudet et al., 2017; Scott et al., 2015). It has even been argued that the power of fieldwork lies in its informal nature and that it should not resemble ordinary schoolwork too much (Rea, 2008).

We identified approaches and practices which the biology teachers had used to include outdoor environments in their formal teaching. The findings suggest that initially outdoor learning appears to students more like fun trips without real learning objectives. The teachers needed to use ways to make outdoor lessons resemble ordinary school activity. Regularity, assessment and a supportive curriculum as well as co-operation within a school were used to justify outdoor teaching to the students as 'real schoolwork'. We have shown that these practices follow the process of institutionalizing an activity (Berger and Luckmann, 1966). Following Berger and Luckmann's conceptualization, the teachers considered extensive outdoor education successful when the students perceived it as *objective reality* and did not question the *legitimacy* of the regular fieldwork. Only then could the goals of authentic biology learning as well as affective and environmental educational goals be reached.

Institutionalization of outdoor teaching practices helps teachers exert control during outdoor lessons through the controlling aspect of the institutional reality itself as well as added controlling mechanisms such as assessments (c.f. Berger and Luckmann, 1966). However, teachers considered students' freedom in outdoor lessons as important in order to achieve the learning goals and to learn to deal with group management problems. These seemingly contradictory approaches to control and freedom appear particularly interesting when compared to previous studies that have shown teachers' fear of losing control and group management issues as obstacles to outdoor teaching (Glackin, 2016; Fägerstam, 2014; Ayotte-Beaudet et al., 2017). Our findings suggest that the institutional structure in outdoor teaching with regularity is useful as a controlling framework, within which it is possible for the teachers to promote students' freedom and their authentic nature experiences without loss of control being a problem. Contrary to previous studies, the fieldwork-oriented teachers in this study believed that taking students outdoors and giving them more freedom and autonomy reduced behavioural problems and group management issues.

The tension between the desire to institutionalize outdoor teaching and the actual practices of the teaching was apparent in two ways. Firstly, the practices that supported or enabled students' freedom and spontaneous activities in the forest diverged from the typical institutional order of school and classroom activities (c.f. Davies and Guppy, 2010, 136). Secondly, the teachers reflected the tension between the curricular learning goals and the affective and experiential goals of the teaching. These tensions become understandable and less contradictory when we acknowledge the *decoupled* nature of the school as an institution (Meyer and Ramirez, 2000; Meyer et al., 1997). The teachers' actual practices in the classrooms do not need to follow the standardized formal structures whose primary purpose is to legitimate the school system at the societal level. The Finnish context in which teachers, relatively speaking, have a great deal of freedom to design their own teaching further emphasises the possibility for teachers to deviate from the standard

institutional order (c.f. Niemi, Toom, and Kallioniemi, 2016, 19–38). While some of the goals and practical approaches of the teachers in this study seemed to contest the standardized structures, the teachers still took advantage of the institutional structures to make their pedagogical choices possible. Following the conceptualization of Berger and Luckmann (1966) and Meyer and Ramirez (2000), we suggest that the teachers acted within the boundaries of the decoupled school institution in a way that legitimized their pedagogical choices for outdoor teaching as an institutional activity just as much as was needed to make it work, while the activities and even the goals still diverged from the standard formal classroom-like practices.

Limitations

This study focused on the selected three teachers who were known to use outdoor teaching in natural environments near their schools extensively during their biology courses as compared with typical biology (Lloyd et al., 2012; Kärnä, Hakonen, and Kuusela, 2012; Uitto and Kärnä, 2014). One can argue, that the study of this type reveals only the particular opinions of the selected teachers. However, the focus on untypical cases allows a theoretical understanding of the specific phenomenon at a broader and more general level, something that cannot be acquired by studying average cases (Flyvberg, 2006). There is abundant research on teachers' perceived obstacles to outdoor teaching (e.g. Lock, 2010; Scott et al., 2015). We argue, that by focusing on teachers who have found ways to use outdoor education to an exceptionally large extent, we can acquire unique theoretical information about how these obstacles can be overcome. Whereas findings are not representative of an average science or biology teacher, they develop understanding of outdoor teaching as an institutionalized process (Berger and Luckmann, 1966) and advance the discussion on promoting outdoor education in schools.

In the study, the pedagogical practices and choices of the teachers were identified from teachers' interviews. Although the teachers' views and practical knowledge is at the core of reforming science education (Van Driel, Beijaard, and Verloop, 2001), the use of teachers' views as a representation of their teaching practices can also be noted as a limitation. Studies on the actual outdoor practices or studies of students' perception of learning would provide complementary viewpoints on the theme.

Implications

Concerns about the small amount of fieldwork in the schools (Lock, 2010; Kärnä, Hakonen, and Kuusela, 2012) have been accompanied by several valuable studies on why teachers find outdoor teaching difficult (e.g. Scott et al., 2015; Glackin, 2018). This article represents a move from obstacles to outdoor teaching to successful pedagogical practices by focusing on selected educators who have managed to include extensive outdoor instruction as part of their formal biology teaching. We have argued that a twofold approach to formal outdoor teaching has the potential to overcome many of the observed obstacles. Implementing ways to institutionalize outdoor teaching and justifying it as ordinary teaching for the students is important, as institutionalized activities include a controlling and legitimizing character that makes them plausible to the participants (Berger and Luckmann, 1966). On the other hand, the institutionalization allows the use of pedagogical and practical choices that promote the freedom of students contribute both to authentic learning experiences and to decreased group management issues.

While more research on these two aspects and their influence in the learning situations and for learning outcomes will be valuable, we suggest that our findings have implications for teacher education as well as for curriculum development. According to our findings, the extensive use of nearby natural environments is possible in secondary-school courses on ecosystems and can be further developed in the curricula, as the evidence grows on the diverse benefits of outdoor learning (e.g. Ayotte-Beaudet et al., 2017). Researchers have argued against imposing too much

formal structure on outdoor lessons, as this hampers the spontaneity and authenticity of the experience (Rea, 2008; Lavie Alon and Tal, 2017). We suggest that outdoor education does not have to resemble classroom teaching with its rigorously structured tasks or without room for spontaneous reflection, even if the outdoors activities observe the boundaries of the formal curriculum. The combination of promoting students' freedom in learning outdoors with practices that institutionalize outdoor teaching as an ordinary and justified activity for students will be a key factor to consider in the efforts to increase the use of outdoor education and teachers' competencies in implementing it. Rather than being an add-on to lessons, outdoor teaching should be considered a long-term process for which students need practice and habituation, as has been noted in previous studies (Fägerstam, 2014; Randler, Ilg, and Kern, 2005). Below, we list three key points that, based on our findings, a teacher willing to implement extensive outdoor teaching should take into consideration.

- Regularity. Students need to get used the idea of learning outdoors, so just a single fieldtrip or two will not achieve all the benefits.
- Justification. It is necessary to explicitly show and justify for the students that learning outdoors is important way of learning biology. Adding assessment to outdoor tasks is one potential way to justify them as real studying. Justification is also important in the school community and with parents.
- Promoting the freedom of students. Students' freedom may serve diverse positive outcomes, provided that they are used to outdoor learning and that the control is produced through habitualization, well-planned tasks, assessment, and for example mobile-based interaction with the teacher.

The present study focused on outdoor teaching and explored ways to include it successfully in the formal curriculum. In addition to learning outdoors, many other out-of-classroom activities and excursions are considered to be important, but also challenging parts of formal science education (Rennie, 2014; Resnick, 1987; Lloyd et al., 2012). Although some of the practical solutions used by the teachers in this study relate to outdoor environments in particular, our findings can also be applied to other out-of-school activities. Reducing tension between the formal school system and the informal characteristics of out-of-school-activities while still supporting students' authentic and autonomous learning experiences should be a topic for further theoretical discussion and empirical research.

Disclosure statement

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ORCID

Anttoni Kervinen http://orcid.org/0000-0003-1689-6457
Anna Uitto http://orcid.org/0000-0002-1568-7808
Kalle Juuti http://orcid.org/0000-0001-8696-2611

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